



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/590,380	08/23/2006	Francis Walter Verpoort	50613/003001	8396
21559	7590	02/17/2010		
CLARK & ELBING LLP 101 FEDERAL STREET BOSTON, MA 02110			EXAMINER QIAN, YUN	
			ART UNIT 1793	PAPER NUMBER
			NOTIFICATION DATE 02/17/2010	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentadministrator@clarkelbing.com

Office Action Summary

Application No.

10/590,380

Applicant(s)

VERPOORT ET AL.

Examiner

YUN QIAN

Art Unit

1793

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 November 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 92-95 and 100 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 92-95 and 100 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB-08)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date _____

DETAILED ACTION

Election/Restrictions

Applicant's election without traverse of Group I, claims 92-95 and 100 in the reply filed on November 30, 2009 is acknowledged.

The claims 58-91, 96-99 and 101-103 are withdrawn.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 92 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Specifically, the claims are drawn to "salts or solvates" of a multi-coordinate metal complex. None of the numerous examples in the specification provide examples for either a salt or solvate of a multi-coordinate metal complex. Further, the preparation of solvates is unpredictable, and one of ordinary skill in the art would be unable to determine if a metal complex was capable of forming a solvate until after it is formed. There are not a representative number of examples and for this reason one of skill in

the art would recognize that Applicant was not in possession of species having these necessary features.

Claim 92 is additionally rejected for failing to comply with the written description requirement because the catalyst specified in that claim is not limited to transition metal-containing catalysts. For example methods according to claim 92 wherein the multi-coordinated metal complex contains other than a Ruthenium metal are not described in the specification. It does not reasonably provide enablement for the same wherein the metal in the catalytic entity is from Group 1 of the periodic table, the alkali metals. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to practice the invention commensurate in scope with these claims.

The Wands Factors provide a guide for determining the scope of enablement:

- (A) The breadth of the claims;
- (B) The nature of the invention;
- (C) The state of the prior art;
- (D) The level of one of ordinary skill;
- (E) The level of predictability in the art;
- (F) The amount of direction provided by the inventor;
- (G) The existence of working examples; and

(H) The quantity of experimentation needed to make or use the invention based on the content of the disclosure.

In re Wands, 858 F.2d 731, 737 8 USPQ2d 1400, 1404 (Fed. Cir. 1988)

A. The claims are quite broad in their scope. Claim 92 reads on as discussed above in the rejection 35 U.S.C 112(1) under the written description part of the first paragraph of subject matter which was not conceived by applicants.

B, C, and D. The nature of the invention is a chemical process/method, wherein a catalyst is employed. The state of the prior art with respect to this particular claimed embodiment is that there is a dearth of guidance available to one of ordinary skill for making up for the deficiencies of the disclosure. The level of one of ordinary skill in the art is that of a person who holds a graduate-level degree in organic chemistry. Inventors in the instant case hold such credentials, as they are University professors.

E. One cannot predict how a given metal complex will behave with a given multi-coordinated ligand, in catalyzing metathesis polymerization and atom group transfer reactions. Because the scope of the claims is so broad, there is no way to predict whether or not an alkali metal or other transition metal in a complex as specified in the instant claims would behave as a catalyst for all of the claimed metathesis and atom group transfer reactions, or if an alkali metal ion and transition metal other than ruthenium would function as a catalyst at all. Catalytic activity determinations are essentially empirical.

F. The inventors have provided direction for how to make various ligands, how to "tune" the ligands to the substrates, and have shown which reactions are best catalyzed by one catalyst of the invention. No direction is provided to one of ordinary skill as to how changing the metal in the catalyst will affect activity, or how this would change the way in which the complex is prepared.

G. The only transition metal demonstrated in a catalyst is ruthenium. The specification includes over forty examples wherein the metal in the catalyst is ruthenium only (Examples 2-43). The examples where the metal in the catalyst other than ruthenium are not described in the best mode examples.

H. One of ordinary skill in the art would obviously have to experiment to realize the full scope of what is being claimed, specifically to practice the processes/methods according to the instant claims where the metallic element in the catalyst other than ruthenium. What is missing from the disclosure is any mention of how alkali metals or transition metals other than ruthenium would differ in their catalytic activity from ruthenium. Ruthenium is the only metal demonstrated in the specification.

The differences between ruthenium complexes and other metal complexes necessitate that one of ordinary skill in the art begins experimenting where applicants left off and develop themselves:

1. Catalysts comprising the other metals complexed with multi-coordinated ligands according to the invention.

2. Determine the optimum reaction conditions (temperature, concentrations, solvents), and limits of the catalytic activity of these catalysts.

3. Further expand on 1 and 2 to adapt the catalysts to more complicated systems as are specified in the claims, like a method of use in olefin metathesis and atom group transfer reactions.

In doing so, one of ordinary skill in the art would clearly not be relying on the teachings of the specification or the state of the art.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

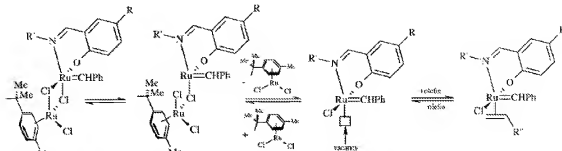
This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 92 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lynn et al. (WO 99/22865) in view of De Clercq et al. (Adv. Synth. Catal. 2002, 344, No 6+7, 639-648).

Regarding claim 92, Lynn et al. teaches acid activation of ruthenium metathesis catalysts and living ROMP metathesis polymerization (title). Ruthenium carbene complexes having multidentate Schiff base ligand is activated by acid (0.3-1.0 equivalent) to improve reaction rates and yields of olefin metathesis reaction (abstract, Example 7, page 28, line 14). Bronsted acid and photoacid generators (applicant's second catalysts) are used in the acid generation ROMP and photoinitiated-ROMP system (example 7, page 28).

Although the ruthenium carbene Schiff base ligand complexes taught by Lynn et al. are not phosphine group(s) free as per applicant claim 92, De Clercq et al. teaches Schiff bases monometallic and homobimetallic ruthenium catalysts for Ring-closing polymerization and ring-opening metathesis polymerizations (title). The ruthenium complexes **2a-f** and **3a-f** as shown below are phosphine ligand free, ruthenium carbene Schiff base ligand complexes met the limitations of the instant claim (Scheme 2, page 643):



Scheme 2. Mechanism for metathesis reactions with catalytic systems 2a-f and 3a-f.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Lynn et al. and De Clercq et al. to obtain the invention as specified in the claim 92, motivated by the fact that the combination of ROMP and ATRP methodologies with ruthenium complexes can make new polymers with interesting properties and high commercial potential (pages 640 and 645). Since both of them (Lynn et al. and De Clercq et al.) teach the use Schiff base ligand ruthenium carbene complexes for ROMP and RCP polymerizations, it would have a reasonable expectation of success.

Product-by-process limitation in this claim is noted. It is considered while the product of the reference is made by a different process, the product made and disclosed is the same as being claimed. see "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." (In re Thorpe, 227 USPQ 964,966). Once the Examiner provides a rationale tending to show that the claimed product appears to be the same or similar to

that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product (In re Marosi, 710 F.2d 798, 802,218 USPQ 289, 292 (Fed. Cir. 1983), MPEP 2113)

Claim 93 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combined references (Lynn et al. and De Clercq et al.) as applied to claim 92 above, and further in view of DeSimone et al. (US 5,840,820).

Regarding claim 93, although neither Lynn et al. nor De Clercq et al. specifically teaches the co-catalyst as per applicant claim 93, DeSimone et al. teaches metathesis initiator promoted olefin metathesis in carbon dioxide medium. Metathesis initiator comprises organoaluminum compounds, titanium salts, alkyl magnesium halides, etc. (col.5, lines 43-65).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Lynn et al., De Clercq et al. and DeSimone et al. to obtain the invention as specified in the claim 93, motivated by the fact that the olefin metathesis reactions carries out in a CO₂ medium, it provides an inexpensive solvent system, which is environmentally compatible, and easily separable from the polymers produced (col. 3, lines 7-14). Since both of them (Lynn et al., De Clercq et al. and DeSimone et al.) teach the metathesis polymerizations, it would have a reasonable expectation of success.

Claims 94 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combined references (Lynn et al. and De Clercq et al.) as applied to claim 92 above, and further in view of DeSimone et al. (US 5,382,623).

Regarding claim 94, although neither Lynn et al. nor De Clercq et al. specifically teaches the co-catalyst as per applicant claim 94, DeSimone et al. teaches azobisisobutyronitrile (AIBN) initiated heterogeneous polymerization in carbon dioxide medium (abstract, col. 7, line 11).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Lynn et al., De Clercq et al. and DeSimone et al. to obtain the invention as specified in the claim 94, motivated by the fact that the olefin polymerization carries out in a CO₂ medium, it provides an inexpensive solvent system, which is environmentally compatible, and easily separable from the polymers produced, as the CO₂ can simply be vented from the reaction vessel (col. 2, lines 1-45).

Claims 95 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combined references (Lynn et al. and De Clercq et al.) as applied to claim 92 above, and further in view of Matyjaszewski et al. (US 5,763,548).

Regarding claim 95, although neither Lynn et al. nor De Clercq et al. specifically teaches the co-catalyst as per applicant claim 94, Matyjaszewski et al. teaches using organic halides as model halogen atom initiators in atom transfer radical polymerization as shown below (abstract, claim 6):

6. The process of claim 1, wherein said initiator is of the formula:



20

where:

X is selected from the group consisting of Cl, Br, I, OR¹⁰, SR¹¹, SeR¹⁴, OP(=O)R¹⁴, OP(=O) (OR¹⁴)₂, OP(=O)OR¹⁴, O—N(R¹⁴)₂ and S—(=S)N(R¹⁴)₂, where R₁₀ is alkyl of from 1 to 20 carbon atoms in which each of the hydrogen atoms may be independently replaced by halide, R¹⁴ is aryl or a straight or branched C₁–C₂₀ alkyl group, and where an N(R¹⁴)₂ group is present, the two R¹⁴ groups may be joined to form a 5- or 6-membered heterocyclic ring; and

25

30

R¹¹, R¹², and R¹³ are each independently selected from the group consisting of H, halogen, C₁–C₂₀ alkyl, C₃–C₈ cycloalkyl, X(=Y)R⁵, Cl(=Y)NR⁶R⁷, COCl, OH, CN, C₂–C₂₀ alkenyl, C₂–C₂₀ alkynyl, oxiranyl, glycidyl, aryl, heterocyclidyl, aralkyl, aralkenyl, C₁–C₆ alkyl in which from 1 to all of the hydrogen atoms are replaced with halogen and C₁–C[∞] alkyl substituted with from 1 to 3 substituents selected from the group consisting of C₁–C₆ alkoxy, aryl, heterocyclidyl, C(=Y)R, Cl(=Y)NR⁶R⁷, oxiranyl and glycidyl;

35

40

where R⁵ is alkyl of from 1 to 20 carbon atoms, alkoxy of from 1 to 20 carbon atoms, aryloxy or heterocyclyloxy; and R⁶ and R⁷ are independently H or alkyl of from 1 to 20 carbon atoms, or R⁶ and R⁷ may be joined together to form an alkylene group of from 2 to 5 carbon atoms, thus forming a 3- to 6-membered ring; such that no more than two of R¹¹, R¹² and R¹³ are H.

45

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Lynn et al., De Clercq et al. and Matyjaszewski et al. to obtain the invention as specified in the claim 95, motivated by the fact that the participation of free radical intermediates in ATRP is supported by end-group analysis and stereochemistry of the polymerization. In addition, polymers with various topologies (e.g., block, random, star, graft, hyperbranched, dendritic end-functional and in-chain functional copolymers (for example, of styrene and methyl (meth) acrylate) have been synthesized using the present process. The polymeric products encompassed by the present invention can be widely used as plastics, elastomers, adhesives, emulsifiers, thermoplastic elastomers, etc (abstract).

Claims 100 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combined references (Lynn et al. and De Clercq et al.) as applied to claim 92 above, and further in view of Verpoort et al. (EP 1329455).

Regarding claim 100, although neither Lynn et al. nor De Clercq et al. specifically teaches the co-catalyst as per applicant claim 100, Verpoort et al. teaches supported metal carbene complexes used in metathesis reactions as shown below (title, claim 4):

4. A supported catalyst for use in a heterogeneous catalytic reaction, comprising:

- (a) a catalytically active compound according to claim 1, wherein M is selected from the group consisting of ruthenium, osmium, iron, molybdenum, tungsten, titanium and rhenium, and
- (b) a supporting amount of a carrier suitable for supporting said catalytically active compound (a).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Lynn et al., De Clercq et al. and Verpoort et al. to obtain the invention as specified in the claim 100, motivated by the fact that the catalyst can be easily removed from a reaction mixture ([0011]).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to YUN QIAN whose telephone number is (571)270-5834. The examiner can normally be reached on Monday-Thursday, 10:00am -4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jerry Lorengo can be reached on 571-272-1233. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J.A. LORENZO/
Supervisory Patent Examiner, Art Unit 1793

/YUN QIAN/
Examiner, Art Unit 1793